

Restraint Means

1 The present invention relates to a restraint means or
2 apparatus, and more specifically a restraint means
3 that is suitable for safely restraining a child or
4 animal whilst walking under competent supervision.

5

6 Accidents involving children are most common and can
7 present a serious problem, particularly with active
8 children who are not competently supervised when out
9 walking. Even the most conscientious of persons can
10 be momentarily distracted whilst supervising a child,
11 at it is at such times that the child is vulnerable.

12

13 A variety of means have been previously proposed to
14 safely restrain children in such instances. These
15 include upper body straps that attach via buckles and
16 clasps to a tethered line. Such restraints have a
17 number of disadvantages, such as the time taken to
18 fit the straps as each vertical upper body strap as
19 well as each horizontal upper body strap has to be
20 individually adjusted. In addition, it can be

1 relatively straightforward in some instances for the
2 child to undo the buckle or clasp securing the
3 straps. Furthermore, when not in use such restraints
4 can be problematic with regards to stowage,
5 especially when travelling, and are consequently
6 difficult to unravel when the restraint is next to be
7 fitted to the child.

8

9 Another common fault with known restraint means can
10 occur during shopping trips when parents require
11 their hands to be free in order to pick up goods in
12 stores or personal possessions such as purses and
13 handbags to enable payment to be made at a point of
14 purchase. At such times, a parent may have to
15 momentarily let go of the straps, also known as
16 reins, with which the parent is connected to the
17 child. Again, such moments can lead to the
18 unrestrained child wandering away from the parent,
19 making them more vulnerable and also increasing the
20 likelihood of accident or injury. The aforementioned
21 problems are equally applicable to known restraint
22 means used with animals, such as dog leads, for
23 example.

24

25 It is an aim of the present invention to obviate or
26 mitigate one or more of the aforementioned
27 disadvantages with known restraint means.

28

29 According to the present invention, there is provided
30 a restraint means adapted to restrict the relative

1 movement between a first person and a second person,
2 the restraint means comprising:

3 a body adapted to be removably attached to the
4 first person;

5 a rotatable drum located on the body;
6 a cable having a first end connected to the drum
7 and a second end having an attachment means thereon,
8 the attachment means being adapted to be secured to
9 the second person; and

10 a locking means adapted to selectively lock the
11 rotating drum so as to prevent rotation thereof.

12

13 Preferably, the locking means comprises a trigger
14 pivotably attached to the body and adapted to
15 selectively engage the rotating drum. Preferably,
16 the drum has a rotational axis and a face of the drum
17 includes at least one first detent portion extending
18 radially outwardly from the rotational axis, and the
19 trigger includes at least one first pawl adapted to
20 engage the first detent portion when the trigger is
21 operated.

22

23 Preferably, the trigger is provided with a means for
24 disengaging from the drum. Preferably, the
25 disengagement means is a biasing means adapted to
26 bias the trigger away from the drum. Alternatively,
27 the disengagement means is a button formed on the
28 trigger for manual operation thereof.

29

1 In a preferred embodiment, the trigger is provided
2 with a projecting portion, wherein a portion of the
3 cable is threaded around the projecting portion such
4 that a predetermined force applied to the cable will
5 bring the trigger into engagement with the drum.
6 Preferably, the trigger has a longitudinally
7 extending channel and the projecting portion is a bar
8 extending laterally across the channel.

9

10 In an alternative preferred embodiment, the locking
11 means further comprises:

12 at least one second detent portion provided on
13 the body adjacent the circumference of the drum and
14 extending radially inwardly towards the drum;

15 at least one second pawl member pivotably
16 attached to a face of the drum and adapted to engage
17 the second detent portion of the body; and

18 a biasing means adapted to bias the second pawl
19 member towards the rotational axis of the drum.

20

21 Preferably, the locking means further includes an
22 abutment member positioned on the face of the drum
23 between the second pawl member and the circumference
24 of the drum face, the abutment member limiting the
25 radially outward movement of the second pawl.

26

27 Most preferably, the locking means further comprises:

28 a plurality of second detent portions provided
29 on the body adjacent the circumference of the drum
30 and extending radially inwardly towards the drum;

1 a pair of second pawl members pivotably attached
2 to a face of the drum at substantially diametrically
3 opposite locations, and adapted to engage the
4 plurality of second detent portions of the body; and
5 each second pawl member having a biasing means
6 adapted to bias the second pawl member towards the
7 rotational axis of the drum. The locking means
8 further includes a pair of abutment members, each
9 abutment member positioned on the face of the drum
10 between a respective second pawl member and the
11 circumference of the drum face, the abutment members
12 limiting the radially outward movement of the
13 respective second pawls.

14

15 Preferably, the drum includes a biasing means adapted
16 to apply a substantially constant recoil force to the
17 drum in a first rotational direction.

18

19 Preferably, the body and attachment means are adapted
20 such that the attachment means can be located on the
21 body when not in use.

22

23 Preferably, the attachment means comprises a cover
24 member having a recess in which the second end of the
25 cable is attached. Preferably, the attachment means
26 further comprises a belt adapted to be fitted about
27 the second person, the belt having a catch adjacent
28 one end thereof and a catch housing adjacent the
29 opposite end thereof, the catch housing being adapted
30 to receive both the catch and the cover member

1 thereon. Preferably, the cover member substantially
2 covers the catch housing when received thereon,
3 thereby preventing direct access to the catch and
4 catch housing.

5

6 Preferably, the second person is a child and the
7 restraint means is a child restraint means.

8

9 Alternatively, the second person is an animal and the
10 restraint means is an animal restraint means.

11

12 The present invention will now be described, by way
13 of example only, with reference to the accompanying
14 drawings, in which:

15

16 Figure 1 shows a right side view of a restraint
17 means;

18 Figure 2 shows an exploded view of the body of
19 the restraint means of Figure 1;

20 Figure 3 shows a part-assembled view of the body
21 of Figure 2;

22 Figure 4 shows a projected view of the fully
23 assembled body of Figure 2;

24 Figure 5 shows a right side view of the body of
25 Figures 2-4 with a first embodiment of locking means,
the cover of the body removed;

27 Figure 6 shows a right side view of the body of
28 Figures 2-4 with a second embodiment of locking
means, the cover of the body removed;

1 Figure 7 shows a right side view of the body of
2 Figures 2-4 with a third embodiment of locking means,
3 the cover of the body removed;

4 Figure 8 shows a left side sectional view of the
5 body of Figure 7;

6 Figure 9 shows an exploded view of an attachment
7 means of the restraint means;

8 Figures 10(a)-(e) show front, rear, top, side
9 and projected views, respectively, of the attachment
10 means of Figure 9; and

11 Figure 11 shows a schematic view of the
12 restraint means in use.

13

14 Figure 1 shows a restraint means in accordance with
15 the present invention, generally designated 1. The
16 restraint means 1 comprises a body 10, and an
17 attachment member, or cover member, 12 received in an
18 aperture 14 at one end of the main body 10 and
19 connected to the main body by a cable (not shown).

20 The main body 10 includes a locking means in the form
21 of a hand-operated trigger 16 including a manual
22 trigger release switch 18 integrally formed with the
23 trigger 16. Operation of the trigger 16 and release
24 switch 18 will be described in more detail below.

25

26 Figure 2 shows an exploded view of the components
27 located on the body 10 of the restraint means 1. The
28 body 10 comprises a pair of shell, or cover, members
29 20,22 formed from a suitable plastics material and
30 adapted to be fitted together in a snap-fit

1 arrangement. A first of the cover members, here
2 designated 22, acts as a base member to which the
3 remaining components are fitted, whilst the second
4 cover member, here designated 20, is simply fitted
5 over the components once they are all assembled on
6 the first cover member 22.

7

8 The first cover member 22 is divided into front and
9 rear compartments by a divider 36. The rear
10 compartment 21 includes a number of attachment points
11 24 formed on the inner surface thereof for receiving
12 corresponding attachment projections or the like (not
13 shown) formed on the inside of the second cover
14 member 20. Also formed in the rear compartment 21 of
15 the first cover member 22 is a spindle 26 which
16 projects substantially perpendicular to the first
17 cover member 22. The spindle is provided with a
18 groove 28 into which one end of a torsion spring 30
19 is fixed. The torsion spring 30 of the preferred
20 embodiment described here is a leaf-type spring
21 formed from a tightly coiled metal band, one end of
22 which is fixed in the spindle groove 28 as described
23 whilst the other end is fixed into a groove (not
24 shown) in the inner bore of a cable drum 32. The
25 spring 30 imparts a substantially constant rotational
26 recoil force on the drum 32, and hence the cable on
27 the drum 32. Abutment members 34 are also formed in
28 the rear compartments 21 of the cover members 20,22
29 to limit the amount of travel available to the
30 trigger 16. Pivot members 35 also project from the

1 inner surface of each cover member 20,22 in order to
2 receive the end of the trigger 16.

3

4 In the front compartment 23 of the first cover member
5 22 are one or more longitudinally extending guides 38
6 which project into the front compartment 23 from the
7 cover member 22. In addition to the guide(s) 38, the
8 front compartment 23 of the first cover member 22
9 also includes one or more resilient clips 40. The
10 guide(s) 38 and clip(s) 40 are both adapted to engage
11 and hold the cover member 12 when it is located in
12 the body 10.

13

14 The cable drum 32 holds a coiled cable (not shown)
15 which connects the main body 10 and the cover member
16 12. The cable is held on the outer surface of the
17 drum 32 between a pair of radially projecting flanges
18 44. One end of the cable is secured to the drum 32
19 via holes 42 provided in one of the radially
20 projecting flanges 44. The outer face of each flange
21 44 is provided with a number of detent portions, in
22 this example ratchet teeth 46, which themselves
23 project radially outwardly from the axis of rotation
24 of the drum 32. A drum cover 48 fits over the end of
25 the spline 26, holding the spring 30 in place in the
26 drum 32.

27

28 The trigger 16 is an elongate member which has a
29 release switch 18 formed at one end thereof, and a
30 pair of pivot apertures 50 formed at the opposite end

1 thereof for receiving the pivot members 35 of the
2 cover members 20,22. Also formed on the trigger 16
3 are a pair of upwardly projecting pawls 52 which are
4 adapted to engage the ratchet teeth 46 of the drum
5 32, as will be described below.

6

7 The outer surface of the first cover member 22, which
8 cannot be seen in Figure 1, is adapted to receive a
9 clip member 54. The clip member 54 operates in a
10 substantially conventional manner, having a resilient
11 tongue 56 adapted to removably attach the clip 54,
12 and main body 10, onto the belt or other suitable
13 attachment point of a person. The clip 54 has a pair
14 of outwardly extending projections 58 which are
15 received in corresponding guides (not shown) formed
16 on the outer surface of the cover member 22.

17

18 Figure 3 shows the aforementioned components once
19 fitted to the first cover member 22, with the second
20 cover member 20 awaiting fitting to the first cover
21 member 22. Figure 4 shows the first and second cover
22 members once they have been fixed together to form
23 the body 10.

24

25 The preferred, though not exclusive, application of
26 the present invention is as a child restraint means.
27 The body 10 of the restraint means is provided with a
28 locking means to ensure that the cable stored on the
29 drum 32 will not continuously run off the drum 32
30 when pulled. Figure 5 shows a first embodiment of

1 the locking means in which manual locking of the drum
2 is provided for. In normal circumstances, once the
3 cover member 12 has been removed from the main body
4 10 and attached to a child, the cable 60 will feed
5 out from the drum 32 via a cable aperture 62 provided
6 in the divider 36. In order to stop the cable 60
7 feeding out from the drum 32, the person to whom the
8 body 10 is attached can squeeze the trigger 16, which
9 will bring the pawls 52 of the trigger 16 into
10 contact with the ratchet teeth 46 of the drum 32.
11 Each of the ratchet teeth 46 is provided with an
12 abutment face 64 facing anti-clockwise and a sloping
13 face 66 facing in the opposite, clockwise, direction.
14 Thus, as the drum 32 rotates anti-clockwise in
15 feeding the cable 60 out, the pawls 52 of the trigger
16 16 will contact an abutment face 64 of a ratchet
17 tooth 46, thereby preventing any further rotation of
18 the drum 32 in the anti-clockwise direction. This
19 will prevent the cable 60 from being pulled out any
20 further. The sloping faces 66 of the teeth 46 ensure
21 that clockwise rotation of the drum 32 under the
22 recoil action of the spring 30 to retrieve the cable
23 60 is not inhibited by the pawls 52. A further
24 spring (not shown) can be provided in the main body
25 at the pivot end of the trigger 16 as a disengagement
26 means. The spring would disengage the trigger 16
27 from the drum 32 and push the trigger 16 back to its
28 unlocked position. Alternatively, the release switch
29 18 can be used to push the trigger back to the
30 unlocked position manually.

1
2 Figure 6 shows a second embodiment of the locking
3 means for the cable, where locking of the cable can
4 be affected automatically. The second embodiment of
5 the locking means shares the majority of the
6 components used in the first embodiment, and so the
7 same reference signs are used in Figure 6 as in
8 Figure 5 for those shared components. Where the
9 second embodiment differs from the first embodiment
10 is that the trigger 16 includes a projecting portion
11 which projects from the trigger 16. The projecting
12 portion could take various forms but here it is shown
13 as a bar 70 which extends laterally across a
14 longitudinal channel formed in the trigger 16 between
15 the pawls 52. In the second embodiment, the path of
16 the cable 60 is arranged so that the cable 60 runs
17 underneath the bar 70 on its passage between the
18 cable drum 32 and the cable aperture 62. In other
19 words, the cable 60 is threaded around the bar 70.
20 As a result, when a sufficiently large force is
21 applied to the cable 60 whilst running off the drum
22 32, the cable 60 will contact the bar 70, thereby
23 lifting the trigger 16 towards the drum 32. This
24 lifting of the trigger 16 by the cable 60 will bring
25 the pawls 52 of the trigger 16 into contact with the
26 ratchet teeth 46 of the drum 32, thereby halting the
27 anti-clockwise rotation of the drum 32 and preventing
28 the cable 60 from feeding out any further. The
29 trigger 16 will then remain in the locking position
30 until the release 18 is operated or, if present, the

1 biasing spring is allowed to push the trigger 16 back
2 to its rest position. In this way, excessive and
3 sudden feeding out of the cable 60 can be
4 automatically stopped.

5

6 Figures 8 and 9 show a third embodiment of the
7 locking means for locking the cable, where again the
8 locking of the cable can be done automatically if
9 there is a sudden force applied to the cable whilst
10 feeding out. As a number of components in the third
11 embodiment are shared with the first and second
12 embodiments, they are assigned the same reference
13 numbers and will not be described further here. The
14 third embodiment uses the centrifugal force of the
15 rotating drum 32 to lock the drum 32 if the
16 centrifugal force becomes too great as a result of
17 sudden acceleration of the cable 60 during use. This
18 third locking means can be present by itself or else
19 the trigger 16 can also be present for a manual
20 override facility, as shown in Figure 7.

21

22 As shown in Figure 8, the rear of the drum 32 (when
23 viewed in Figure 7) is provided with a pair of
24 pivoting pawls, or arms, 80 which are fixed to
25 projecting pivot points 82 formed on the drum 32.
26 Each arm 80 is also connected to the drum 32 by a
27 tension spring 84 or similar biasing means. As can
28 also be best seen in Figure 8, the drum 32 has a bore
29 86 through which the spindle 26 is received. One end
30 of each tension spring 84 is attached to an arm 80,

1 whilst the opposite end of each spring 84 is attached
2 to the drum 32 adjacent the bore 86 of the drum 32.
3 Abutment members 88 are also provided upon the drum
4 32. Under the action of the springs 84, the arms 80
5 are biased towards the centre, or rotational axis, of
6 the drum 32 and will ordinarily rest on the abutment
7 members 88 until a sufficiently large centrifugal
8 force is applied during the rotation of the drum 32.
9 A final modification to the drum 32 of this third
10 embodiment is the provision of brace, or abutment,
11 members 90 on the outer circumference of the drum 32.
12 The brace members 90 are raised members formed on, or
13 affixed to, the surface of the drum 32. The brace
14 members 90 are positioned so that they restrict the
15 radial movement of the arms 80. Thus the pivoting
16 movement of the arms 80 is restricted inwardly by the
17 abutment members 88 and outwardly by the brace
18 members 90.

19

20 For illustrative purposes, one of the arms 80 shown
21 in Figure 8 is in the rest position against the
22 abutment member 88, whilst the other of the arms 80'
23 is in the locking position against the brace member
24 90. It will be understood that the illustrated
25 situation would not arise during actual operation of
26 the restraint means, as both arms 80,80' would be
27 subjected to the same forces at the same time.

28

29 In order to lock the drum 32 in this third
30 embodiment, the first cover member 22 is provided

1 with a set of detent portions, or ratchet teeth, 92
2 positioned adjacent the circumference of the drum 32
3 and projecting radially inwardly towards the drum 32.
4 The ratchet teeth 92 can be fixed inside the first
5 cover member 22, or else they can be integrally
6 formed with the first cover member 22. As previously
7 stated, the drum 32 is subjected to a rotational
8 acceleration which is caused by a linear acceleration
9 of the cable 60. This rotational acceleration
10 creates a centrifugal force which acts upon the arms
11 80. If this centrifugal force surpasses a
12 predetermined level, which is defined by the tension
13 of the springs 84, the arms 80 will pivot outwardly
14 about pivot points 82. This outward pivoting of the
15 arms 80 will take the end of each arm 80 outside the
16 circumference of the drum 32 and into engagement with
17 one of the inwardly projecting ratchet teeth 92, as
18 illustrated by arm 80' in Figure 8. This engagement
19 of the arm 80 and the ratchet teeth 92 will lock the
20 drum in place. The brace members 90 ensure that
21 excessive shear forces are not placed on either the
22 arm 80 or the teeth 92 during this locking
23 engagement. Once the drum 32 has locked, there will
24 no longer be any centrifugal force acting on the arms
25 80, and they will return to their rest position under
26 the action of the springs 84, thereby freeing the
27 drum 32 to rotate again. Although shown in Figures 7
28 and 8, the trigger 16 need not be present unless a
29 manual override for the locking means is also
30 desired.

1

2 Figures 9 and 10(a)-(e) show various views of the
3 attachment means of the restraint means, the
4 attachment means being used to connect the restraint
5 means to a child in this example. The attachment
6 means may simply comprise the attachment member, or
7 cover member, 12 with a suitable means for attaching
8 itself to a second person, such as a clip (not
9 shown). However, as seen in the exploded view of
10 Figure 9, the attachment means may alternatively
11 comprise not only the cover member 12 of the main
12 body 10, but also a belt (not shown) and a fastener,
13 generally designated 100, for attachment to a second
14 person. The fastener 100 comprises a housing 102 and
15 a catch 104. The catch 104 is adapted to be
16 detachably held within the housing 102 and includes a
17 pair of resilient prongs 106 for this purpose. The
18 upper and lower edges 108,110 of the housing 102 each
19 have a cut away portion 112 which gives the housing
20 102 a substantially H-shaped appearance. When
21 attaching the housing 102 and catch 104 together, the
22 catch 104 is moved towards the housing 102 in the
23 direction of arrow A. The relative dimensions of the
24 two components means that as the catch 104 enters the
25 housing 102, the resilient prongs 106 come into
26 contact with the inner surfaces of the edges 108,110
27 of the housing. This contact deforms and bends the
28 prongs 106 towards one another. Once the prongs 106
29 reach the cut away portion 112, they are no longer in
30 contact with the inner surfaces of the edges 108,110

1 and thus spring back outwards. The prongs 106 are
2 then engaged with the cut away portions 112 of the
3 housing, thereby ensuring that the housing 102 and
4 catch 104 are fixed together. To undo the fastener
5 100, the prongs 106 are compressed by hand through
6 the cut away portions 112 and the catch 104 is slid
7 from the housing in the opposite direction to arrow
8 A. Each of the housing 102 and the catch 104 is
9 provided with an aperture 114,116 through which the
10 ends of an adjustable belt (not shown) are secured to
11 each respective component, the belt adapted to be
12 placed around the waist of the second person.

13

14 The cover member 12 comprises a cover 120 which has a
15 front face 122 and a rear face 124. The rear face
16 124 is provided with a recess or cable housing 126
17 for receiving the end of the cable 60, which passes
18 through the body portion 120 from the front face 122
19 to the rear face 124 via a cable aperture 123. The
20 recess or housing 126 has a secondary cover 128 which
21 is secured over the housing 126. At either side of
22 the body portion 120 are two substantially U-shaped
23 guides 130 which are arranged such that they face one
24 another across the rear face 124 of the body portion
25 120. The guides are each provided with a cut away
26 portion 132.

27

28 The fastener housing 102 has a pair of resilient,
29 upwardly extending, prongs 134 adapted to engage with
30 the guides 130 of the cover member 12. Once the belt

1 around the second person has been adjusted to the
2 correct girth and the fastener housing 102 and catch
3 104 have been attached together, the cover member 12
4 can be attached to the fastener 100, thereby
5 attaching the wearer of the belt to the main body 10
6 of the restraint means. The cover member 12 slides
7 onto the fastener 100 by moving in the direction of
8 arrow B shown in Figure 9. The prongs 134 on the
9 housing 102 and the guides 130 of the cover member 12
10 are dimensioned such that the resilient prongs 134
11 will be compressed towards one another when the
12 guides 130 engage them. Once the guides 130 have
13 passed over the prongs 134 to the point where the
14 prongs 134 reach the cut away portions 132 of the
15 guides 130, the prongs will spring outwardly away
16 from one another, thereby engaging on the cut away
17 portions 132 of the guides 130. The cover member 12
18 will then be secured to the fastener in the manner
19 shown in the various views of Figure 10.

20

21 By fitting the cover member 12 over the fastener 100
22 in this manner, direct access cannot be gained to
23 either the end of the cable 60 or the connection
24 between the fastener housing 102 and catch 104.
25 Thus, it is difficult for a child, for example, to
26 themselves disconnect either (i) the cable from the
27 cover member 12 or (ii) the catch 104 from the
28 fastener housing 102. By fastening the belt around
29 the child and then attaching the cover member 12 to
30 the fastener 100, the child is thereby connected to

1 the main body 10 of the restraint means, which will
2 be attached to the individual supervising the child.
3 Thus, if the child makes any sudden movements away
4 from the supervising individual, or wanders too far
5 from the individual, either the locking means in the
6 main body, or else the cable reaching its full
7 extent, will prevent the child from moving any
8 further away, as illustrated schematically in Figure
9 11.

10

11 Although the pair of cover members are preferably
12 fitted together using a snap-fit arrangement, any
13 other suitable fixing means may be used, such as
14 screws or adhesive, for example. In addition, it is
15 to be understood that although a leaf-type torsion
16 spring has been described as the preferred means of
17 imparting a recoil force on the cable drum, any other
18 suitable spring or biasing means may be used instead.
19 Furthermore, although a cable is described as the
20 preferred way of attaching the main body and the
21 attachment member together, any other suitable means
22 for attachment could be used instead, such as cord or
23 the like.

24

25 The preferred embodiments described above illustrate
26 a plurality of detent portions, or ratchet teeth,
27 provided on both the drum and the body. It should be
28 appreciated that so long as there is at least one
29 detent portion provided along with at least one
30 respective pawl in the described embodiments, the

1 invention will still work. Thus, the invention is
2 not limited to the use of pluralities of detent
3 portions and pawls.

4

5 Although the present invention has been described for
6 use with persons, and in particular a child, there is
7 no reason why the restraint means could not also be
8 applied in other areas, such as with suitably sized
9 domestic pets and other animals, for example.

10

11 Furthermore, it is envisaged that the majority of the
12 main components of the present invention will be
13 manufactured from a durable and strong plastics
14 material, such as nylon. However, it will be
15 appreciated that other suitable materials may also be
16 used for the manufacture of the invention, and thus
17 the invention is not limited to this particular
18 material.

19

20 These and other modifications and improvements may be
21 incorporated without departing from the scope of the
22 invention.